Dear Editor:

We would like to enquire about the suitability for *Current Biology* of our manuscript. “The specificity of sequential Statistical Learning.”

Statistical Learning mechanisms allow humans and other animals to link together regular co-occurring elements in many domains. In humans, such mechanisms may support many cognitive processes, especially language acquisition. Ever since Saffran et al.’s (1996, Science) seminal paper, it has been generally assumed that such Statistical Learning mechanisms allow learners to learn and remember words from fluent speech, but this assumption has never been tested.

Here we test this assumption by exposing participants to continuous speech streams (as in earlier Statistical Learning tasks), but then simply ask them to repeat back the words they remember. We find no memory for words whatsoever under the conditions used in all previous verbal Statistical Learning tasks even when participants demonstrably learn the statistical structure of the speech streams. In contrast, we find reliable memories for words if the speech stream is pre-segmented, mimicking prosodic structure in language, but do not observe any Statistical Learning under these conditions. This double dissociation between Statistical Learning and (declarative) memory suggests that Statistical Learning is dissociable from the declarative memory mechanisms required to acquire words, but might have other specialized functions during language acquisition, for example to facilitate predictive processing.

We believe that this manuscript will be exciting news for the readership of *Current Biology*, and we hope that you agree.

Sincerely,

Ansgar Endress & Maureen de Seyssel

Title: The specificity of sequential Statistical Learning

Abstract:

Learning statistical regularities from the environment is ubiquitous across domains and species. Such learning mechanisms are often remarkably tuned to ecological learning situations, and separable from declarative memory mechanisms. Statistical Learning mechanisms might be particularly critical for the earliest stages of language acquisition, notably to identify and memorize words from fluent speech (i.e., for word-segmentation). Here, we ask if the Statistical Learning mechanisms involved in word- segmentation are tuned to specific learning situations, and how they interact with the (declarative) memory mechanisms needed to re- member words. We show that these mechanisms predominantly operate in continuous speech sequences similar to those used in prior word-segmentation experiments, but not in discrete chunk sequences, even though the latter are likely encountered during language acquisition (due to the prosodic organization of language). Conversely, when exposed to continuous sequences in a memory recall experiment, participants are sensitive to probable syllable transitions, but, to the extent that they remember any items at all, they tend to initiate their productions with random syllables rather than with word onsets. In contrast, familiarization with discrete sequences produces reliable memories of actual, high-probability forms. This dissociation between Statistical Learning and (declarative) memory mechanisms suggests that Statistical Learning might have a specialized role when distributional information can be accumulated (e.g., for predictive processing), and that it is separable from the (declarative) memory mechanisms needed to acquire words.